EXHIBIT A

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Autopsy and Anatomic Pathology
Clinical Pathology and Toxicology
Forensic Pathology

Neuropathology
Epidemiology
Medico-Legal Consultations

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21800 Burbank Boulevard, Suite 310
Woodland Hills, CA 91367

February 6, 2024

Dear Mr. Galipo,

Re: Margarito Edvin Lopez, Jr., Deceased
Medico-Legal Report

Summary of Education, Training and Experience

I completed medical school in 1990 at the University of Nigeria, Enugu, Nigeria. Upon graduating from medical school, I completed a one-year clinical housemanship at the University of Nigeria Teaching Hospital in the fields of Pediatrics, Internal Medicine, General Surgery, Obstetrics, and Gynecology. After housemanship, I worked as an emergency room physician at a university hospital in Nigeria for approximately three years. I sat for and passed my United States Medical Licensing Examinations [USMLE] while I worked as an emergency room physician. I came to the United States in 1994 through a World Health Organization scholarship to become a visiting research scholar for eight months at the Department of Epidemiology, Graduate School of Public Health, University of Washington, Seattle, Washington.

In 1995, I proceeded to the College of Physicians and Surgeons of Columbia University, New York, at Harlem Hospital Center, to complete residency training in Anatomic Pathology and Clinical Pathology. In 1999 I proceeded to the University of Pittsburgh, Pittsburgh, Pennsylvania to complete residency training in Forensic Pathology and Neuropathology. I hold four board-certifications in Anatomic Pathology, Clinical Pathology, Forensic Pathology and Neuropathology. I also hold a Masters in Public Health [MPH] degree in Epidemiology from the Graduate School of Public Health, University of Pittsburgh, Pittsburgh, Pennsylvania. I also hold a Masters in Business Administration [MBA] degree from the Tepper School of Business, Carnegie Mellon University, Pittsburgh, Pennsylvania, one of the leading business schools in the world. I am a Certified Physician Executive and an Honorary Fellow of the American Association of Physician Leadership [AAPL]. I also hold a fifth board-certification in Medical Management from the AAPL. I am currently licensed to practice Medicine and Surgery in the State of California.

I am currently the President and Medical Director of Bennet Omalu Pathology [BOP], a California medico-legal consulting firm, and a Clinical Professor at the Department of Medical

Pathology and Laboratory Medicine, University of California, Davis. In my capacity as the Medical Director of BOP, I am a consulting Forensic Pathologist and Neuropathologist to many hospitals in central California and to several counties in northern California. There are less than a few dozen practicing Forensic Pathologists-Neuropathologists in the United States who are board-certified in both Forensic Pathology and Neuropathology.

For over twenty years, I have been involved in over thirteen thousand death and injury investigations in my career as a Forensic Pathologist and Neuropathologist, which began in 1999. I have personally conducted and performed over twelve thousand autopsies and death investigations and examined over thirteen thousand brain tissue specimens. I also perform trauma pattern analysis in both living patients and deceased patients to determine causes and mechanisms of sustenance of injuries and death. I am also involved in the evaluation of living victims of all types of injuries and trauma, including but not limited to victims of assault, traumatic falls, industrial and accidental injuries, medical complications and misadventures, rape, child abuse and sports-related injuries. I have been consulted and retained as an expert witness in one to two thousand cases involving all types of medico-legal cases across all jurisdictions in the United States including federal, state, county and municipal courts and arbitration panels; in both civil and criminal cases, for the plaintiff, defense, district attorneys and public defenders. I have been involved as an expert witness in complex class action and industrial lawsuits involving thousands of individuals and major corporations.

My areas of interest and focus include brain patho-physiology, brain injuries and brain trauma, in both living and deceased patients. I identified Chronic Traumatic Encephalopathy [CTE] in a retired football player when I performed an autopsy and examined the brain of Mike Webster in 2002. Subsequently, I identified CTE in other high-impact, high-contact sports athletes and in military veterans suffering from Post-Traumatic Stress Disorder [PTSD]. Since 2002 CTE has received international attention from the sports industry, sports medicine, and neuroscience. My work has been featured extensively in all media platforms across the world. My work and life were featured in a major Hollywood film, “Concussion” released in December 2015 by Sony Motion Pictures, in which the renowned actor, Will Smith, played me as Dr. Omalu. Several New York Times best-selling books have also been published on my life and work including “The League of Denial” and “Concussion.” I have published several books including my memoir, “Truth Doesn’t Have a Side,” which was published in August 2017. My latest book, “Brain Damage in Contact Sports” was published in February 2018. I have published extensively in the medical and scientific literature, authoring many scientific papers and book chapters.

I have received three honorary PhD degrees from two universities in the United States, and from the Royal College of Surgeons of Ireland in recognition of my work and expertise. I have also received numerous awards from across the world in recognition for my work and expertise in both living and deceased patients. I have received the “Distinguished Service Award” from the American Medical Association [AMA], which is the most prestigious award of the AMA. I have been honored by the United States Congress and I have appeared on multiple occasions before committees of the United States Congress and committees of State Legislatures across the Unites States advising them on matters relating to trauma. In 2019 and 2020 I was appointed to the Traumatic Brain Injury Board of the State of California to advise the state on matters relating to traumatic brain injuries.

Since 1999 I have testified as an expert witness in matters relating to all types of injuries and deaths in over 600 court proceedings across the United States. I have attached a copy of my

curriculum vitae, which enumerates my body of work and experience in greater detail. The cases I have testified in, beginning in 2009, are enumerated at the end of my curriculum vitae.

Pursuant upon your request, I have reviewed the following materials sent to me on the case of Margarito Edvin Lopez, Jr (Margarito Lopez), Deceased:

1. Autopsy Report
2. Autopsy Pictures
3. Medical Records from Los Angeles County University of Sothern California (LAC + USC) Medical Center
4. Los Angeles Fire Department (LAFD) PRE-Hospital Care Report
5. Body-Worn Camera Video Footage by the Police Officers
6. Deposition Transcripts

In order to perform and apply a valid differential diagnosis method including but not limited to Bradford Hill Criteria[1] analysis, Central Limit Theorem analysis and Clinico-Pathologic Correlation analysis, on this case, I had to review, document, and analyze the materials sent to me on this case in considerable depth and detail. Such differential diagnosis and review would form the foundation for my case-specific and general causation opinions in this case.

Brief Summary of Prevailing Forensic Scenario[2]

At the time of his death on December 18, 2021, Margarito Edvin Lopez Jr. (Margarito Lopez) was a 22-year-old male (born on May 28, 1999).

Body-worn camera footage show that on December 18, 2021, officers of the Los Angeles County Police Department were dispatched to a residence following a 911 call for a mental crisis by Margarito Lopez's sister. Police officers arrived at the residence of the deceased at approximately 05:00 p.m. and parked their vehicles at a distance from Margarito Lopez, who was sitting on a flight of stairs in front of the residence, and directed spotlights at him. The officers began yelling and shouting at Margarito Lopez to drop the knife.

The officers continued shouting at him with their weapons drawn at him while he was sitting on the staircase. After about three to four minutes of officers shouting at Mr. Lopez, he stood up, and the officers fired less-than-lethal rounds at him. He walked down the flight of stairs and sat down again at the bottom of the stairs. After about another six to seven minutes Mr. Lopez stood up again and began to turn around when he was struck by less-than-lethal rounds and multiple rounds of gunshots at about 05:10 p.m. Margarito Lopez fell to the ground on his back.

At about 05:11 p.m. some police officers approached him and found him flaccid on the ground, unresponsive. An officer held him by his right arm and put him in the prone and left lateral positions and handcuffed him. Paramedics were dispatched at 05:06 p.m. and arrived at the patient at 05:13 p.m. At 05:17 p.m. Mr. Lopez was noted to be unresponsive, and at 07:17 p.m. his documented vital signs were: BP 146/117, pulse 102, resp 5 and Glasgow Coma Score (GCS) 3. He was placed onto a gurney and taken to the ambulance for transport to the hospital (Los

[1] Hill, AB. The Environment and Disease: Association or Causation? Proc R Soc Med. 1965 May;58(5):295-300. PMID: 14283879; PMCID: PMC1898525.
[2] This section of the report should not be used to establish the facts in this case and is not intended to be used to establish the facts in this case.

Angeles County University of Southern California Medical Center). At 05:23 p.m. his BP was 85/ Diastolic Exam Finding Not Present, pulse 130, resp 0, and GCS 3.

While en route to the hospital, Margarito Lopez lost his radial pulse, and respirations were noted to be shallow with diminished breath sounds. A needle was placed in both second intercostal spaces with improved compliance. He was ventilated via bag-valve-mask (BVM) and a 16-gauge intravenous access was secured for the administration of a liter of intravenous fluid (normal saline). An occlusive bandage was placed on the anterior chest wound. Upon arrival at the hospital at about 05:24 p.m., care was transferred to trauma staff and a report was given to the trauma team and the registered nurse.

Medical records from the Los Angeles County University of Southern California (LAC + USC) Medical Center stated that Margarito Lopez was pulseless and unresponsive at the time of his arrival. His pupils were 3 mm bilaterally and breathing was supported with non-rebreather bagging. He had endotracheal intubation with ventilation, and a left sided thoracotomy and a right chest tube placement which yielded a large amount of blood. Significant intraoperative findings included bilateral penetrating lung injuries, bilateral hemothoraces, and a penetrating spinal column injury. According to the trauma team, there was no blood in the pericardium. He was transfused with 3 units of packed red blood cells. Due to the absence of an organized cardiac rhythm, cardiac massage was initiated. A dose of intra-cardiac Epinephrine was given with resultant organized cardiac motion and carotid pulse. The chest was covered with towels, and he was transported emergently to the OR.

While in transit to the operating room, he had a repeat cardiac arrest and cardiac massage was initiated. He was transferred to the operating table with an ongoing cardiac massage. A formal exploration of the clamshell thoracotomy was performed with an ongoing cardiac massage. During the exploration of the clamshell thoracotomy, an exploratory laparotomy was done which revealed no evidence of hemoperitoneum or traumatic injury. The heart was noticed to be fibrillating during the exploration of the clamshell thoracotomy, so Margarito Lopez was shocked 3 times using 50 joules of energy with no return of organized rhythm. Between these shocks, 2 intra-cardiac doses of Epinephrine were administered without a return of cardiac activity. Cardiac massage was continued for an additional 10 minutes with no return of an organized cardiac rhythm. Due to a lack of cardiac activity after 40 minutes of cardiac massage, a decision was made to pronounce Margarito dead at 06:09 p.m. In the OR, he received 8 units of red blood cells and 2 units of fresh frozen plasma.

Autopsy

A full autopsy was performed on the body of Margarito Lopez on December 22, 2021, at the Los Angeles County Department of Medical Examiner-Coroner by Dr. Brice L. Hunt, Deputy Medical Examiner. Dr. Hunt opined that Margarito Lopez, a 22-year-old adult male died as a result of a gunshot wound of the torso. The manner of his death was determined to be a homicide. At autopsy, Margarito Lopez weighed 98 pounds and measured 56 inches.

Dr. Hunt described the following evidence of trauma:

Gunshot wound #1 (Neck):

There was a ¼ x ¼ inch entrance wound located on the anterior right neck, about 7 inches below the top of the head, 4-1/2 inches right of the anterior midline, and 1-1/2 inches below the right ear. It had an ½ inch eccentric marginal abrasion that is widest at the 3'o clock position.

There was a ½ x ¼ inch angular exit wound located on the posterior midline of the neck, 7 inches below the top of the head. The direction of the wound was from front to back and right to left. The projectile passed through the soft tissue of the neck without perforating any of the major deep vessels. The gunshot was at an intermediate range and no projectile was retained. There was an associated soft tissue hemorrhage.

Gunshot wound #2 (Torso):
There was a ¼ x ¼ inch entrance wound on the lateral right chest, 4 inches below the acromioclavicular joint, 12 inches below the top of the head, and 1 inch posterior to the axillary midline. It had a 1/16-inch circumferential marginal abrasion. There was a 5/16 x 5/16-inch exit wound located on the left back, 16 inches below the top of the head, and 5 inches left of the posterior midline. The direction of the wound was from front to back, right to left, and downward. The gunshot was at an intermediate range. The projectile traveled through the lateral right chest wall, right rib #7, into the right thoracic cavity through the lower lobe of the right lung, through the T8 vertebra and spinal cord, into the left thoracic cavity through the lower lobe of the left lung, posterior left rib #8, and completely exited the soft tissue of the left back. No projectile was retained. Associated injuries include perforating wound of the right lung with approximately 150 cc right hemothorax, perforating wound of the left lung with approximately 150 cc left hemothorax, vertebral body fracture of T8 with spinal cord transection, lateral right rib #7 fracture, and posterior left rib #8 fracture.

Gunshot wound #3 (Torso):
There was a ¼ x ¼ inch entrance wound located on the anterior right chest, 16 inches below the top of the head, and 3 inches right of the anterior midline. It had a 1/8-inch dried circumferential marginal abrasion. There was a ½ x ¼ inch exit wound with irregular edges located on the posterior right shoulder, 10 inches below the top of the head, and 8 inches right of the posterior midline. The direction of the wound was front to back, right to left, and upward. The gunshot was at an intermediate range. The projectile traveled through the soft tissue of the right torso and did not enter the thoracic cavity. A small fragment of the copper jacket was recovered from the soft tissue of the right shoulder. There was an associated soft tissue hemorrhage.

Blunt force injuries:
1. There was a 3 x 2-inch purple-blue contusion located on the lower right abdomen, 25 inches below the top of the head and 2-1/2 inches right of the anterior midline. It had a 1-1/2 x 1-inch dried semi-circular abrasion. The wound may represent an impact site from a less-lethal weapon.
2. There was a 1-1/2 x 1-inch abrasion located on the upper right buttock, 25 inches below the top of the head, and 5 inches right of the posterior midline. The wound may represent an impact site from a less-lethal weapon.
3. There was a ¼ x ¼ inch abrasion on the right elbow.

The brain weighed 1575 grams. There was minimal atherosclerosis of the cerebral arteries. The heart weighed 240 grams and the right and left lungs weighed 260 grams and 220 grams respectively and were dark red-purple. The thoracic and abdominal aorta had minimal atherosclerosis. There was focal endocardial hemorrhage in the anterior left ventricle (0.3 cm) and the right atrium (2.5 cm). The liver weighed 1225 grams and was tan-brown.

Dr. Hunt enumerated the following diagnoses:

I. Gunshot wound #1 (Neck):
   A. Entry: Anterior right neck
   B. Exit: Posterior neck
   C. Direction: Front to back, right to left
   D. Path: Through the soft tissue of the neck
   E. Projectile: None retained
   F. Range of fire: Intermediate
   G. Associated injuries: Soft tissue hemorrhage

II. Gunshot wound #2 (Torso):
   A. Entry: Lateral right chest
   B. Exit: Left back
   C. Direction: Front to back, right to left, and downward
   D. Path: Through the lateral right chest wall, right rib #7, into the right thoracic cavity, lower lobe of the right lung, through T8 vertebra and spinal cord, into the left thoracic cavity, lower lobe of the left lung, posterior left rib #8, and completely exit the soft tissue of the left back.
   E. Projectile: None retained
   F. Range of fire: Intermediate
   G. Associated injuries:
      1. Perforating wound of the right lung with approximately 150 cc right hemothorax
      2. Perforating wound of the left lung with approximately 150 cc left hemothorax
      3. Vertebral body fracture of T8 with spinal cord transection
      4. Right rib #7 fracture
      5. Left rib #8 fracture

III. Gunshot wound #3 (Torso):
   A. Entry: Anterior right chest
   B. Exit: Posterior right shoulder
   C. Direction: Front to back, left to right, and upward
   D. Path: Through the soft tissue of the upper right torso (did not enter the thoracic cavity)
   E. Projectile: A small fragment of copper jacket was recovered from the right shoulder
   F. Range of fire: Intermediate
   G. Associated Injuries: Soft tissue hemorrhage

IV. Blunt force injuries:
   A. Semi-circular contusion with abrasion, lower right abdomen
   B. Ovoid abrasion, upper right buttock

Medico-Legal Questions

1. **What were the bullet wound characteristics and trajectories of the bullets of the gunshot wounds Margarito Lopez sustained, and what was his body positioning while he was being shot?**
    a. **Was Margarito Lopez "advancing" or "charging" at the officers at the times he was shot by less lethal and lethal rounds?**
    b. **Was Margarito Lopez facing the officers at the time he was shot by less lethal and lethal rounds,**
    c. **Do the trajectories of the bullet wounds indicate that Margarito Lopez was shot by lethal rounds while he was stationary, heading to the ground, or as he was on the ground.**

Medicine is a life science, which is evidence based. The practice of medicine is guided by established standards and generally accepted principles, which certified physicians must adhere to. The specialties and the categories of physicians who are proficiently trained, specialized, and competent in the accurate determination of the cause, mechanism and manner of death and the mechanisms of sustenance of lethal trauma are the forensic pathologists, especially for deaths involving all types of trauma and bodily injury. The death of Mr. Lopez involved serious bodily injury.

It is a generally accepted principle and common knowledge in medicine and forensic pathology, that specific traumatic events generate predictable, reproducible, and specific patterns of traumas and injuries. Applying the clinico-pathologic method of differential diagnosis, a specific documented pattern of trauma can be evaluated, translated, and applied to the determination of the mechanisms of generation, causation, and sustenance of the specified trauma pattern, with a reasonable degree of medical and scientific certainty; based on the established common knowledge and generally accepted principles of trauma patterns and their mechanisms of generation, causation, and sustenance.

The patterns of injuries generated by gunshots, firearms and ballistics weapons, and the mechanisms of generation, causation, and sustenance of these patterns of injuries are very well-established in the medical literature and are common knowledge. Based on the prevailing forensic scenario, and on the generally accepted principles and common knowledge of medicine and science, and based on the global constellation, configurations and anatomic conformations of the gunshot wounds sustained by Margarito Lopez, the mechanisms of generation, causation and sustenance of his fatal injuries can be determined with a reasonable degree of medical certainty.

Based on the physical characteristics and physics of ballistics, partially burnt and hot residues of the gunpowder and soot travel behind the bullet when it exits the muzzle, and due to gravitational forces and the differential densities of the bullet, soot, and residues of gunpowder in the gravitational field, the bullet can travel longest, followed by the partially burnt gunpowder residues, which travel longer than soot. Soot will travel for about 1 foot, before it is pulled down by gravitational forces, and the partially burnt gunpowder residue will travel for about 2-3 feet before it is pulled down by gravitational forces. Therefore, if the muzzle of the gun was closer to the skin by less than 1 foot, you would expect to find marginal soot deposits around the gunshot wounds of entrance [close range shot]. If the muzzle of the gun was closer to the skin by less

than 2-3 feet, you would expect to find powder stippling around the gunshot wounds of entrance [Intermediate range shot]. If the muzzle of the gun was located greater than 2-3 feet away from the skin ad infinitum, you would expect to find only marginal abrasions around the wound without soot deposits or powder stippling [distant range shot]. If there is an eccentric accentuation of the width of the marginal abrasion, it may suggest that the muzzle of the gun was not located perpendicularly to the skin when it was fired, but rather located in the direction of the eccentric accentuation of the marginal abrasion.

Based on these common knowledge and generally accepted principles of medicine and science, Mr. Lopez sustained a total of three gunshot wounds of his body, one of the neck and two of the trunk. None of the wounds exhibited any marginal soot deposits or powder stippling. This means that all the gunshot wounds sustained by Mr. Lopez were distant range gunshot wounds. The officers who shot Mr. Lopez were not located in close range or intermediate range of Mr. Lopez. The muzzles of the guns that fired the bullets were not located in close range or intermediate range of Mr. Lopez. The officers and the muzzles of the guns that fired the bullets were located greater than 2-3 feet, ad infinitum, away from Mr. Lopez when the guns were fired and killed Mr. Lopez. All the gunshot wounds of entrance described at the autopsy revealed only marginal abrasions, without soot deposits or powder stippling. Mr. Lopez was shot at a distance by the police officers, and the guns that fired the bullets were located at a distance from Mr. Lopez. Mr. Lopez was not within close range or intermediate range of the muzzles of the guns or of the officers when he was shot.

The direction of travel of a bullet inside the body can be determined in the three planes of nature by the systematic dissection of the body and description of the anatomic pathway of the bullet and tissue damages and injuries, correlated with the anatomic topographic locations of the gunshot wound of entrance, gunshot wound of exit or recovery of the bullet.

The gunshot wound designated #1 above possessed a lethal capacity because of the topographic anatomic proximity to vital nerves and plexuses of the neck. Since bullets travel at very high velocities, there is a surrounding sphere of high kinetic energy that accompanies the bullet as it encounters, supersedes the tissue resilience, and penetrates the tissues of the body. This high energy sphere [cavity] transfers high levels of disruptive kinetic energy to tissues around the trajectory of the bullet, which can cause tissue injury, without the bullet penetrating the tissue. This phenomenon is what is referred to as the cavitatory effect of bullets. The cavitatory effect, in addition to soft tissue hemorrhages, contusions and lacerations of tissues along the track of the bullet cause neurological injury to vital nerves and plexuses in the neck which can induce bradycardia, systemic hypotension, cardiac arrest, and respiratory arrest, which in turn decrease cerebral perfusion pressure. Such vital nerves and plexuses may include but are not limited to the motor, sympathetic and parasympathetic innervations, the vagus nerve, phrenic nerve, glossopharyngeal nerve, hypoglossal nerve, cervical sympathetic trunks, and cervical parasympathetic ganglia.

The entrance wound of gunshot wound #1 was located on the right side of the neck or the right lateral neck, and exhibited accentuation of the marginal abrasions in the 3 o'clock position. This would mean that the muzzle of the gun that fired the bullet was located on the right side of Mr. Lopez's neck and body when the bullet was fired and slightly to the front. This would mean that the officer that fired the gun was located on the front right side of Mr. Lopez. Mr. Lopez was less likely facing the officer head-on when he was shot by the officer. Therefore, it was less likely that Mr. Lopez was advancing and charging at the officer when he was shot by the officer.

Mr. Lopez was only 4 feet 8 inches tall. The trajectory of the bullet inside his neck was backward and leftward. The bullet entered and exited at about the same level from the top of the head. The video clips show officers pointing guns at Mr. Lopez at the levels of their chests, therefore since Mr. Lopez was a relatively short-statured man, it is more likely than not that the gun that fired the bullet was located at about the same height as his neck when it was fired.

The gunshot wound designated #2 above possessed a lethal capacity. The bullet perforated, contused, lacerated and fractured the lateral right chest wall and lateral 7th rib, perforated the right and left pleural cavities, perforated, contused and lacerated the lower lobes of the right and left lungs, perforated, contused, lacerated and fractured the T8 vertebra and spinal cord, transecting the spinal cord, perforated, contused, lacerated and fractured the left posterior chest wall and back, and the posterior left 8th rib. The gunshot wound of entrance was located on the posterior lateral right chest, at the level of the caudal axilla behind the mid axillary line. It showed circumferential marginal abrasions without any eccentric accentuation. This means that the bullet perpendicularly perforated the skin. These specified anatomic configurations and conformations of the gunshot wound of entrance indicate that the gun and officer that fired the bullet were located to the back of the right side of Mr. Lopez when the bullet was fired. Mr. Lopez was not facing the officer and the gun when he was shot. Therefore, it was less likely that Mr. Lopez was advancing and charging at the officer when he was shot by the officer.

The trajectory of the bullet was backward, downward, and leftward. The bullet exited in the mid left postero-lateral thoracic back. The gunshot wound of exit was located 16 inches below the level of the top of the head, and the gunshot wound of entrance was located 12 inches below the level of the top of the head. The entrance wound was located in the rostral postero-lateral right chest, the exit wound was located in the mid left postero-lateral thoracic back. The differential distances from the top of the head of the entrance and exit wounds, the uniquely acutely angled, inclined and beveled trajectory of the bullet inside the body, and the dispositions and stances of the police officers as seen in the video clips as they fired their guns, would be consistent with an individual who was shot while he was falling on the ground, close to the ground or on the ground when he was shot. The muzzle of the gun that fired the bullet was located at a level that was higher than the level of Mr. Lopez's axillae and shoulders when he was shot. For gunshot wound #2, it is very much less likely that Mr. Lopez was shot while he was standing erect on his feet, facing the officer who shot him or advancing and charging at the officer who shot him.

The gunshot wound designated gunshot wound #3 above did not possess any immediate lethal capacity. The bullet only perforated, contused, and lacerated the skin and superficial soft tissues of the right chest wall and shoulder without penetrating the pleural cavity or perforating any vital tissue, vessel, or nerve. The gunshot wound of entrance was located on the right anterior caudal chest, at the level of the nipples, 16 inches below the level of the top of the head and 3 inches right of the anterior midline. Allegedly there was no accentuation of the marginal abrasions [the wound had been partially obliterated and effaced by the thoracostomy surgical incision and surgical sutures, and there was no close-up autopsy picture of the wound]. The bullet perforated, contused, and lacerated the skin and soft tissues of the right anterior chest wall, the right anterior and lateral shoulder and the right posterior and lateral shoulder and proximal arm to exit. The gunshot wound of exit was located on the right posterior and lateral shoulder and proximal arm, 10 inches below the level of the top of the head, and 8 inches right of the posterior midline. The trajectory of the bullet was backward, upward, and rightward.

The gun and the police officer who fired the bullet were located on the left of the front of Mr. Lopez, and the muzzle of the gun was located at a level lower than the level of Mr. Lopez's

nipples. The trajectory of the bullet was very acutely inclined, beveled, tangential and superficial. More likely than not, the composite locations of the gunshot wounds of entrance and exit, and the highly inclined trajectory of the bullet were generated by an individual who was shot while he was falling to the ground, close to the ground or on the ground, especially given his short stature and height of 4 feet 8 inches tall. Therefore, it was less likely that Mr. Lopez was advancing and charging at the officer when he was shot by the officer.

None of Mr. Lopez's gunshot wounds exhibited any trajectory that was close to a perpendicular orientation, therefore, it is even less likely that he was charging face-on and advancing towards the officers when he was shot from a distance.

In addition to three gunshot wounds, the autopsy report described two additional abrasion-contusions that were interpreted as impact sites of less-lethal rounds. One of the abrasion-contusions was located on the right lower abdominal quadrant, and the other was located on the lateral right upper buttock. This would mean that the firearm and officer that fired the round that caused the wound on the abdomen were located in the front of Mr. Lopez. The firearm and officer that fired the round that caused the wound on the back of the buttock were located in the back of Mr. Lopez. When Mr. Lopez received the round that caused the wound on his buttock, he was not facing the officer and could not have been charging at the officer or advancing at the officer.

2. Did Margarito Lopez experience conscious pain and suffering, and for how long?

It is a generally accepted principle and common knowledge in medicine and forensic pathology, that specific traumatic events generate predictable, reproducible, and specific patterns of traumas and injuries. The patterns of traumas/injuries generated by blunt force impacts, gunshots, firearms and ballistics weapons, and the mechanisms of sustenance of these patterns of traumas/injuries are very well established in the medical literature and have become common knowledge.

Patho-physiology of conscious pain and suffering

Conscious pain and suffering is initiated by widespread free nerve endings situated in the skin, soft tissues, and organs. Pain can be elicited by multiple types of stimuli classified into three broad categories: mechanical, thermal, and chemical pain stimuli. Nerve endings for pain sensations generate electrical action potentials following contact of any part of the body with an impacting surface and following all types of mechanical tissue damage caused by kinetic energy and blunt force trauma. Similarly, nerve endings for pain and heat sensations generate electrical action potentials following contact of any part of the body with flames and heat and following all types of tissue damage caused by flames and heat. The fundamental mechanism of injury sustenance for gunshots is kinetic energy transference, which causes mechanical destruction of tissues. Action potentials are the sub-cellular physiologic basis for noxious conscious sensations and originate from voltage gated sodium and potassium electrolyte membrane pumps in the cell membranes of nerve cells, fibers, and synapses.

It takes a few 10, 000$^{th's}$ of a second to generate action potentials. Action potentials are transmitted through nerve fibers to the brain. They are transmitted in peripheral nerves in the Aδ and C fibers for fast and slow pain respectively at impulse rates of 5-30 meters per second and 0.5-2 meters per second, respectively. There is therefore a double pain sensation, a fast-sharp

pain, and a slow pain. The sharp pain apprises the person rapidly of imminent danger and prompts the person to react immediately and remove himself from the painful stimulus or imminent danger. The slow pain becomes greater as time passes resulting in continued intolerable pain and suffering prompting the person to continue to try to relieve the cause of the pain and flee from imminent danger.

At autopsy Margarito Lopez measured 56 inches [1.42 meters]. Margarito Lopez felt all types of gunshot induced pain within milliseconds of contact of the bullet with his skin, and within milliseconds of direct blunt force impact and contact of his body with any unyielding surface and less lethal rounds. One millisecond is one second divided into 1000 parts. For the slowest nervous mechanisms of pain sensation and consciousness, a man like Margarito Lopez felt pain within 100 milliseconds.

Nerve pathways transmitting pain, terminate in the spinal cord. Secondary pathways transmit the pain from the spinal cord to the brainstem and thalamus, especially to the reticular activating system of the brainstem. From the thalamus tertiary pathways transmit pain to other basal ganglia, limbic cortex, and neocortex of the brain. Pain stimuli are transmitted to the reticular nuclei of the midbrain, pons, and medulla; to the tectal midbrain and the periaqueductal gray matter. These lower regions of the brain, i.e., brainstem, are vital for the appreciation of the suffering types of pain.

Animals with their brains sectioned above the midbrain, to block any impulse reaching the neocortex and cerebral hemispheres, still experience suffering from pain caused by all types of trauma. Complete removal of the somatosensory regions of the cerebral hemispheres does not preclude an animal's ability to perceive and experience pain. Pain impulses entering the brainstem and lower centers of the human brain can cause conscious perception of pain. Pain perception is principally a function of the lower centers of the brain; however, the upper centers and cerebral hemispheres are responsible for the interpretation of the quality of pain.

Mechanical pain from tissue damage by blunt force trauma and by bullets elicit both the fast and slow pain types. Fast pain is felt within milliseconds while slow pain is felt within about one second. Following mechanical tissue damages, biochemical tissue reactants like bradykinin, serotonin, histamine, prostaglandins, leukotrienes, potassium ions, substance P, acetylcholine, acute phase reactants and proteolytic enzymes are expressed to elicit sustained secondary chemical pain in addition to the primary fast pain directly caused by mechanical tissue damages. The chemical pain elicited by these chemical reactants is a slow type of suffering pain. The intensity of pain is closely correlated with the rate of tissue damage from kinetic energy.

The brain is responsible for and sustains consciousness in human beings. The region of the brain responsible for consciousness is the brainstem. The center in the brainstem, which is responsible for consciousness, is the reticular activating system, which is deeply located in the central regions of the brainstem. As long as the reticular activating system remains anatomically and electrochemically intact, an individual like Margarito Lopez will remain conscious and will feel pain and experience suffering. The sensation of pain induces conscious suffering since pain is a noxious sensation, which stimulates the neocortex, limbic cortex, and forebrain to cause mental pain and suffering. All these neural processes occur in 1000th's of a second [milliseconds]. The human nervous system is one of the most efficient, effective, and optimal operating systems ever known to mankind. After centuries of empirical research mankind has not been able to fully decipher and reproduce the operating systems of the human brain and nervous system.

The primary mechanism of death for the types of gunshot wounds Mr. Lopez suffered is hypo-perfusion or non-perfusion of the brain. The human brain is a post-mitotic organ and can only survive on oxygen and glucose, which are supplied by blood that come from the heart, primarily in the internal carotid arteries and the vertebral arteries. While the brain is only about 2-3% of the body weight, it receives approximately 15% of the cardiac output at a rate of 750-900 ml/min of blood. The normal range of perfusion of the brain is about 50 to 65 ml/100 g/min [80-100 ml/100g/min for the gray matter and 20—25 ml/100g/min for the white matter, at a rate of oxygen consumption of 3.5 ml/100 g/min. The normal brain tissue partial pressure of oxygen is 35 to 40 mmHg. Brain tissue oxygen levels below 30 mmHg may cause brain tissue injury, and at 20 mmHg, the risk of brain damage becomes exponentially elevated. The threshold for brain infarction is 10-12 ml/100g/min of blood supply with neuronal injury and death beginning in 60 to 180 seconds.

Being a post-mitotic organ, the human brain does not have any reasonable capacity to regenerate itself. This means that when the human brain suffers any type of irreversible injury, that injury is permanent and cannot be reversed or cured by the brain or by medical therapy. There are so many types of brain injuries. Hypoxic-ischemic brain injury due to hypo-perfusion or non-perfusion of the brain gunshot wounds is only one type of brain injury. For the human brain to suffer irreversible hypoxic-ischemic brain injury, there has to be an impaired supply of oxygen and blood to the brain for a relatively long period. The established and generally accepted median or mean reference threshold time for irreversible hypoxic-ischemic brain damage to occur is 3 to 5 minutes in cumulative time. This means that irreversible brain damage can occur in less than 3 minutes or in more than 5 minutes, but with a mean or median time of close to 3 to 5 minutes.

Margarito Lopez's conscious pain and suffering

The terminal trauma event which resulted in the violent death of Margarito Lopez began at approximately 05:00 p.m. on December 18, 2021 when police officers arrived at his residence while he was sitting calmly and quietly on the stairs that were in front of his home. Officers approached in their police vehicles with blaring sirens and parked in front of his home with spotlights directed at him. Officers began to yell at him shouting commands at him. At this time Margarito Lopez was fully conscious and aware of his surroundings. Although he was experiencing a mental health episode, he was conscious and aware of his surroundings and had the capacity to experience noxious stimuli, pain, and suffering because these aspects of human functioning are primitive reflexes that autonomic.

His reticular activating center was completely intact and functional. As a 22-year-old adult male he had the mental capacity to identify and classify the approaching officers, the noises of their vehicles and sirens, their yelling and shouting, and the noises of the guns fired as imminent dangers and threats to his life. At this moment, the brainstem nuclei, the frontal cortex, pre-frontal cortex, basal forebrain, and limbic cortex of Margarito Lopez's brain initiated, within 10,000th of a second, action potentials, which initiated within milliseconds, the primitive human reflexes of fleeing from imminent danger.

This mental awareness of imminent danger initiated the nor-adrenergic and adrenergic biochemical neural responses of fear, fright, and flight, when the locus ceruleus of the brainstem released large amounts of nor-adrenalin to the cerebral hemispheres. This fear, fright and flight adrenergic response caused high levels of mental pain and suffering. His heart started pumping faster [chronotropic effect] and stronger [ionotropic effect] due to the nor-adrenergic/adrenergic response. His respiratory rate and general muscle tonicity increased as well due to the nor-

adrenergic/adrenergic response. All these patho-physiologic processes culminated in high levels of conscious mental pain and suffering. Margarito Lopez suffered high levels of mental anguish, mental pain and suffering, fright, and fear, when he identified the imminent danger and threat to his life posed by all the factors and events stated above. Firing the guns generated loud blast noises which instigated mechanical ossicular noxious stimuli and pain from transmission of such loud noises.

The various domains of his brain and cerebral functioning were intact and identified the imminent danger within 1000th's of a second. His limbic system instigated high levels of primitive adrenergic fear-fright-flight response, which caused high levels of emotional pain, mental anguish, and psychological suffering. There may not be many other hyper-acute types of psychological stress that can be more severe than the fear of imminent sudden and traumatic death. This is confirmed by the high levels of adrenalin and nor-adrenalin in individuals who experience such deaths and who manifest the catecholamine effect at autopsy.

As the autopsy has documented, Mr. Lopez sustained multiple blunt force impacts of less-lethal rounds and blunt force trauma. Each impact initiated multimodal transfer of kinetic energy and shearing injuries from the rounds and from the ground. At this time Mr. Lopez experienced physical and mechanical somatic pain caused by every blunt force impact his body sustained. Each blunt force impact of his body activated hundreds to thousands of nerve endings in his tissues and organs and elicited millions of pain action potentials, which were transmitted to the spinal cord and brain to cause high levels of conscious somatic pain, which caused high levels of conscious somatic suffering, which in turn elicited high levels of novel psychological and mental pain, suffering and anguish, which synergized with the previously existing mental and somatic pain and suffering even caused increasingly higher levels of conscious pain and suffering. Within milliseconds to seconds of his trauma, the biochemical cycles and systems in his body began to express acute reactant proteins and peptides in response to the high levels of traumatic stress, which elicited novel chemical pain and suffering, and further accentuated his global conscious pain and suffering.

Following the gunshots, the bullets traveled through air, hit, and perforated Margarito Lopez neck and trunk. When the bullets perforated Margarito Lopez's skin, soft tissues, organs, and skeleton they transferred high levels of kinetic energy and thermal energy to the tissues causing mechanical tissue damages and destruction, which activated thousands to millions of nerve endings and action potentials. He experienced somatic pain and the accompanying mental anguish and suffering in less than 100 milliseconds.

The bullets perforated and damaged the skin and soft tissues of the chest wall and neck, the ribs and intercostal soft tissues and pleurae, the right and left lungs, the thoracic vertebrae, and spinal cord. Perforation of the pleural cavity caused acute and marked elevation of the intra-thoracic pressure in equilibrium with the atmospheric pressure, which caused global atelectasis of the lungs and acute respiratory failure. Perforations and lacerations of the soft tissues and lungs precipitated significant internal bleeding and hemorrhage, which resulted in acute decompensation of the vascular pressure and cerebral perfusion pressure. The constellation of these injuries resulted in acute traumatic shock, which in turn activated millions of nerve endings and action potentials generating high levels of chemical pain.

The multimodal transfer of kinetic energy, including the gunshot wounds and the multifocal blunt force impacts of different regions of his body induced physical and mechanical somatic pain, accompanied by mental pain, anguish and suffering, as well as chemical pain and suffering. Action

potentials were transmitted to the spinal cord and brain to cause high levels of composite conscious pain and suffering. Given the large amounts of kinetic energy a bullet generates, and the matching degree of tissue damage and destruction, the levels of pain and suffering were expectedly high-scale. At this time, the novel and continuing pain and suffering synergized with the pre-existing mental pain, anguish, and suffering. This synergism caused increasingly higher levels of pain and suffering.

Following traumatic shock, Margarito Lopez began to lose his orientation and slowly progressed through the levels and spectrum of consciousness to eventual loss of consciousness. His spinal cord injury caused a spinal shock which made him flaccid and motionless, but yet conscious. He progressed from full alertness to lethargy or somnolence, to obtundation, to stupor or semi-coma, and eventually to superficial or light coma to deep coma, loss of consciousness and eventually death, as he progressively bled internally and suffered the cascades of sequelae of his gunshot wound and injuries. In addition, he progressively lost his motor functioning and lay unresponsive on the ground as the brain began to suffer hypoperfusion and hypoxic-ischemic cerebral injury. At this time, he remained conscious and in a state of progressive hypovolemic and traumatic shock.

He continued to experience somatic and mental pain and suffering, as the cascades of chemical pain and suffering were intensifying his conscious pain and suffering. Within seconds of his trauma, the biochemical cycles and systems in his body began to express acute reactant proteins and peptides in response to the high levels of traumatic stress, which elicited novel chemical pain and suffering, and further accentuated his global conscious pain and suffering.

With the injury to his trunk and neck, according to the autopsy report and findings, his brain and neural axis remained functionally intact above and below the level of transection of the spine. The subcortical ganglia and brainstem nuclei of the cranial nerves remained fully intact. The reticular activating system remained electrochemically intact. The distinctive anatomy of his injuries enabled him to continue to experience increasingly higher levels of somatic pain and suffering, mental pain and suffering, chemical pain, and suffering.

Following his loss of motor functioning, and while he was lying on the ground, secondary traumatic sequences of his injuries progressed, including traumatic shock, hemorrhagic shock, acute cardio-respiratory arrest, and hypoxic-ischemic cerebral injury. As he continued to lose blood from the vascular compartment, and suffer the sequelae of his injures, he progressed into deeper levels of traumatic and hypovolemic shock, as he developed more severe and advanced stages of acute respiratory arrest, acute cardiac arrest, cerebral hypoperfusion and cerebral hypoxic-ischemic injury. Traumatic shock and composite biochemical acute responses to injury progressed to multi-organ-system failure before he became comatose and died.

As the records show, Margarito Lopez progressively lost his vital functioning, respiratory rate, pulse, and blood pressure, as he went into coma. The brain cells can only survive on optimal levels of oxygen saturation and glucose concentration in the blood. However, the human brain has an average intrinsic survival reserve of three to five minutes before it develops irreversible hypoxic-ischemic injury and subsequent brain death. Unconsciousness ensues during this period following global hypoxic-ischemic cerebral injury as Margarito Lopez progressively lost his cardio-respiratory functioning.

Margarito Lopez's loss of consciousness was progressive without any distinctive juncture until he went into a deep coma. According to medical definitions and criteria, his body continued to experience debilitating pain and suffering although he was in coma. The human body continues to

experience debilitating trauma-induced and physiologic chemical pain and suffering until there is a complete cessation of all bodily functions and death. Human beings who are in coma do experience chemical bodily pain and suffering as long as the central nervous system is intact. The unconscious patient remains in a state of high human suffering especially due to chemical pain and suffering because of the ongoing biochemical and molecular responses and systems in his body, especially in response to traumatic shock. In fact, one of the clinical tests for the evaluation of the depth or severity of unconsciousness is to intentionally inflict somatic pain to an extremity of the unconscious patient and observe the patient to see if he withdraws his extremity from the source of pain, moans, or grimaces. Again, this is one of the medical reasons why the majority of unconscious patients in the intensive care unit of hospitals are on strong pain medications and narcotic analgesics like Morphine and Fentanyl.

Although loss of consciousness and death are frequently immediate, they are rarely instantaneous since loss of consciousness and death are processes that involve cascades of patho-physiologic events. The adjective "immediate," within a forensic context, and within the prevailing forensic scenario in this case should be interpreted as death occurring as a result of gunshot wounds without the intervention of another novel or independent object, cause, or factor. It should not be forensically construed as instantaneous.

Based on the global prevailing forensic scenarios in this case and based on the generally accepted principles and common knowledge of medicine and science, including the central limit theorem, Margarito Lopez experienced the highest levels of conscious somatic, mental, and chemical pain and suffering for less than 10 - 15 minutes before he went into deep coma and eventually died[3]. He experienced pre-death pain and suffering for less than 60 to 70 minutes before he eventually died and was pronounced dead[4].

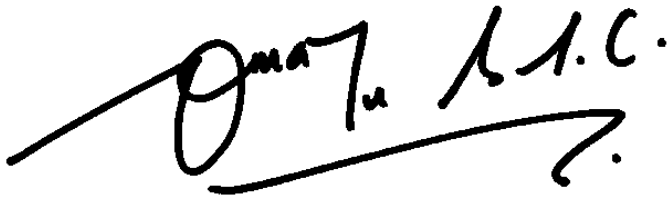
I have provided all my opinions and conclusions with a reasonable degree of medical certainty.

I reserve the right to amend, supplement, revise and/or modify my opinions and report, up and to the time of trial, should additional information become available.

[3] Medicine is not an absolute science, and these estimated ranges should not be interpreted as absolute quantitative estimations of time. Quantitative ranges of any measurable index are common practice and are the standard of practice in pathology and medicine in part based on the principles of the central limit theorem.
[4] Medicine is not an absolute science, and these estimated ranges should not be interpreted as absolute quantitative estimations of time. Quantitative ranges of any measurable index are common practice and are the standard of practice in pathology and medicine, in part based on the principles of the central limit theorem.

Thank you.

Very truly yours,



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APPENDIX A

Margarito T. Lopez, et al. v. City of Los Angeles, et al.

Case Number: 2:22-CV-07534-FLA-MAA

Materials Reviewed:

1. Autopsy Report (DEF 1187-1202)
2. Autopsy Photos (DEF 1031-1080)
3. LAFD Prehospital Care Report (DEF 1123-1127)
4. LAC + USC Medical Records (PLT 0001 -000115)
5. Scene Photos (DEF 124-430)
6. Body Worn Cameras:
    a. DEF 2340 (Burke)
    b. DEF 2341 (Burke)
    c. DEF 2342 (Burke)
    d. DEF 2343 (Jaime)
    e. DEF 2344 (Lopez)
    f. DEF 2345 (Meraz)
    g. DEF 2346 (Prisk)
    h. DEF 2347 (Quintanilla)
    i. DEF 2348 (Yim)
    j. DEF 2349 (Zavala)
7. Deposition Transcripts:
    a. Jose Zavala (July 27, 2023)
    b. Julio Quintanilla (July 27, 2023)